

PTO/SB/21 (08-03)

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**TRANSMITTAL  
FORM**

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Total Number of Pages in This Submission

1 + 26

Application Number

10/087,322

Filing Date

02/28/2002

First Named Inventor

Frederick

Art Unit

2862

Examiner Name

Patidar

Attorney Docket Number

OFFICE OF PATENT

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**ENCLOSURES (Check all that apply)**

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Fee Transmittal Form                                | <input type="checkbox"/> Drawing(s)   | <input type="checkbox"/> After Allowance communication to Group                            |
| <input type="checkbox"/> Fee Attached  | <input type="checkbox"/> Licensing-related Papers                           | <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences        |
| <input type="checkbox"/> Amendment/Reply                                     | <input checked="" type="checkbox"/> Petition <u>37CFR1.181(a)</u> (2 pages) | <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) |
| <input type="checkbox"/> After Final   | <input type="checkbox"/> Petition to Convert to a Provisional Application   | <input type="checkbox"/> Proprietary Information   |
| <input type="checkbox"/> Affidavits/declaration(s)                           | <input type="checkbox"/> Power of Attorney, Revocation                      | <input type="checkbox"/> Status Letter   |
| <input type="checkbox"/> Extension of Time Request                           | <input type="checkbox"/> Change of Correspondence Address                   | <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):            |
| <input type="checkbox"/> Express Abandonment Request                         | <input type="checkbox"/> Terminal Disclaimer                                | Declaration (2 pages)  |
| <input type="checkbox"/> Information Disclosure Statement                    | <input type="checkbox"/> Request for Refund                                 | Exhibit A (2 pages)  |
| <input type="checkbox"/> Certified Copy of Priority Document(s)              | <input type="checkbox"/> CD, Number of CD(s) _____                          | Exhibit B (5 pages)  |
| <input type="checkbox"/> Response to Missing Parts/Incomplete Application    | Remarks   | Exhibit C (15 pages)   |
| <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53 |   |  |

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm  
or  
Individual name

Keith Frantz

Signature

Date

5-17-2004

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I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name

Keith Frantz

Signature

Date

5-13-2004

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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#7/Petition

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of )

Inventor: FREDERICK et al. )

Title: METHODS AND APPARATUS FOR  
SENSING ANGULAR POSITION AND SPEED  
OF A ROTATABLE SHAFT UTILIZING  
LINEARIZED ANNULAR MAGNET AND  
COMMUTATED RATIOMETRIC HALL  
SENSORS )

Serial No. 10/087,322 )

Filing Date: 02/28/2002 )

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Alexandria, VA 22313-1450

Examiner: PATIDAR. MAY 24 2004

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Group Art Unit: 2862

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I hereby certify that this correspondence and documents identified herein are being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 17, 2004.

By

Keith Frantz

*Keith Frantz* 5-17-04

PETITION REQUESTING WITHDRAWAL OF HOLDING OF ABANDONMENT

37 CFR 1.181(a), MPEP § 711.03(c)

Sir:

Applicants respectfully petition for withdrawal of the current holding of abandonment of the above-identified application, and in support thereof state the following facts, supported by the accompanying Declaration of Keith Frantz and Exhibits, and Office records:

1. This Petition is being filed pursuant to 37 CFR 1.181(a), requesting withdrawal of a holding of abandonment by the examiner, because there is a disagreement as to controlling dates, and therefore, requires no petition fee. (MPEP § 711.03(c))

2. The Notice of Abandonment, from which relief is requested, has a mailing date of March 16, 2003. A true and correct copy of this Notice as received is attached as Exhibit A. (Frantz Declaration, ¶ 1.)

3. This Petition is being mailed on May 17, 2003, the first business day following May 16, 2003, and is therefore within the two month window from the mailing date of the Notice of Abandonment in which to file this petition under 37 CFR 1.181(a).

4. The Notice of Abandonment indicates an incorrect date of 26 June 2003 from which a response to an Office letter was due.

5. The correct mailing date of the most recent Office communication (not including the Notice of Abandonment) was July 8, 2003, the mailing date of the most recent Office Action. A copy of this Office Action as received is attached hereto as Exhibit B. (Frantz Declaration, ¶ 2.)

6. The response to the Office Action was mailed under Certificate of Mailing on November 10, 2003, and was accompanied with payment for one month extension of time. A true and correct copy of the response is attached as Exhibit C. (Frantz Declaration, ¶ 3.)

7. Pursuant to 37 CFR 1.136(a)(3)(C), payment of the one month extension fee accompanying the Response was a constructive petition for an extension of time for the concurrent reply, the extension of which is acknowledged in the Notice of Abandonment. (Notice, ¶ 1(a)).

8. The deadline for responding to the Office Action, including the one month extension, expired on November 8, 2003 which fell on a Saturday. (Frantz Declaration, ¶ 4.) Consequently, the response which was mailed under Certificate of Mailing on the next business day, November 10, 2003, was timely filed within the time period established by the Office Action plus the one month extension.

Therefore, it is believed that the holding of abandonment is based on the incorrect date of 26 June 2003 identified in the Notice of Abandonment, and that the response to the Office Action mailed on July 8, 2003 was timely filed on November 10, 2003, and it is requested that the holding of abandonment be withdrawn and prosecution on the merits proceed on said response.

Respectfully submitted,

 5-17-04

Keith Frantz, Reg. No. 37828  
401 West State Street, Suite 200  
Rockford, Illinois 61101  
(815) 987-9820  
(815) 987-9869 [fax]

Serial No. 10/087,322  
Filing Date: 02/28/2002



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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of )

Inventor: FREDERICK et al. )

Examiner: PATIDAR

Title: METHODS AND APPARATUS FOR  
SENSING ANGULAR POSITION AND SPEED  
OF A ROTATABLE SHAFT UTILIZING  
LINEARIZED ANNULAR MAGNET AND  
COMMUTATED RATIOMETRIC HALL  
SENSORS )

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OFFICE OF PETITIONS

Serial No. 10/087,322 )

Group Art Unit: 2862

Filing Date: 02/28/2002 )

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Alexandria, VA 22313-1450

AUG 18 2004

OFFICE OF THE SPECIAL  
PROGRAMS EXAMINER

**DECLARATION OF FACTS IN SUPPORT OF  
PETITION REQUESTING WITHDRAWAL OF HOLDING OF ABANDONMENT  
(37 CFR 1.181(a), MPEP § 711.03(c))**

I, **Keith Frantz**, a citizen of the State of Illinois, United States of America, with an office at Suite 200, 401 West State Street, Rockford, IL, 60010, and as the attorney of record in the above-identified application, make the following declaration of facts in support of the accompanying **PETITION REQUESTING WITHDRAWAL OF HOLDING OF ABANDONMENT**:

1. The Notice of Abandonment of the application has a mailing date of March 16, 2003. A true and correct copy of this Notice as received is attached as Exhibit A.

2. The most recent Office communication (not including the Notice of Abandonment) received in the application was an Office Action with a mailing date of July 8, 2003. A true and correct copy of this Office Action as received is attached hereto as Exhibit B.

3. The response to this Office Action was mailed under Certificate of Mailing on November 10, 2003, and was accompanied with payment for one month extension of time. A true and correct copy of this response is attached hereto as Exhibit C.

4. The deadline for responding to the Office Action, including the one month extension, expired on November 8, 2003 which fell on a Saturday, and the next business day was November 10, 2003.

5. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-identified patent application, any patent issuing thereon, or any patent to which this verified statement is directed.

Declarant: Keith Frantz

Declarant's Signature: 

Date: 5-17-04

Signed at: Rockford, IL, USA

Keith Frantz  
Registration No. 37828  
Suite 200, 401 West State Street  
Rockford, IL 61101  
Citizenship: US  
Post office Address: same as above

Serial No. 10/087,322  
Filing Date: 02/28/2002



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/087,322

02/28/2002

Jeffrey Frederick

2044

20606

7590

03/16/2004

KEITH FRANTZ  
401 WEST STATE STREET  
SUITE 200  
ROCKFORD, IL 61101



EXAMINER

PATIDAR, JAY M

ART UNIT

PAPER NUMBER

2862

DATE MAILED: 03/16/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

**EXHIBIT A**

**Notice of Abandonment**

Application No.

10/087,322

Examiner

Jay M. Patidar

Applicant(s)

FREDERICK ET AL.

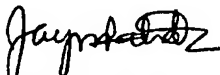
Art Unit

2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on 26 June 2003.
  - (a) ☒ A reply was received on 17 November 2003 (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the period for reply (including a total extension of time of 1 month(s)) which expired on 08 November 2003.
  - (b) ☐ A proposed reply was received on \_\_\_\_\_, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.  
(A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
  - (c) ☐ A reply was received on \_\_\_\_\_ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
  - (d) ☐ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
  - (a) ☐ The issue fee and publication fee, if applicable, was received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
  - (b) ☐ The submitted fee of \$\_\_\_\_\_ is insufficient. A balance of \$\_\_\_\_\_ is due.  
The issue fee required by 37 CFR 1.18 is \$\_\_\_\_\_. The publication fee, if required by 37 CFR 1.18(d), is \$\_\_\_\_\_.
  - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
  - (a) ☐ Proposed corrected drawings were received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the period for reply.
  - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on \_\_\_\_\_ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☐ The reason(s) below:

  
Jay M. Patidar  
Primary Examiner  
Art Unit: 2862

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,322	02/28/2002	Gary L. Frederick		2044

20606 7590 07/08/2003

KEITH FRANTZ  
401 WEST STATE STREET  
SUITE 200  
ROCKFORD, IL 61101

EXAMINER

SNOW, WALTER E

ART UNIT PAPER NUMBER

2862

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

EXHIBIT B



# Office Action Summary

Application No.

10/087,322

Applicant(s)

FREDERICK ET AL.

Examiner

Walter E. Snow

Art Unit

2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-21 is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☒ Claim(s) 4-8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

Art Unit: 2862

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf.

Wolf discloses all of the claimed subject matter, except for the amplifier and the shield.

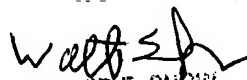
These features are considered obvious matter of design consideration since they are old and known in the art.

3. Claims 4-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

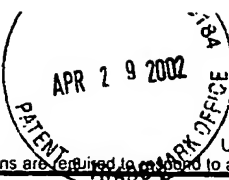
4. Claims 9-21 are allowed.

Snow/ek

06/27/03

  
WALTER E. SNOW  
PRIMARY EXAMINER

Please type a plus sign (+) inside this box → ☐



PTO/SB/08A (08-00)  
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Substitute for form 1449A/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  <i>(use as many sheets as necessary)</i>			<b>Complete if Known</b>	
	<b>Application Number</b>	10/087,322		
	<b>Filing Date</b>	02/28/2002		
	<b>First Named Inventor</b>	FREDERICK		
	<b>Group Art Unit</b>			
	<b>Examiner Name</b>			
<b>Sheet</b>		<b>of</b>		<b>Attorney Docket Number</b>

U.S. PATENT DOCUMENTS						
Examiner Initials <sup>1</sup>	Cite No. <sup>1</sup>	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number	Kind Code <sup>2</sup> (if known)			
WSS	01	4,373,486		Nichols, et al	02-15-1988	
	02	4,425,557		Nakamura	01-10-1984	
	03	4,570,118		Tomczak, et al	02-11-1986	
	04	4,719,419		Dawley	01-12-1988	
	05	5,159,268		Wu	10-27-1992	
	06	5,444,369		Luetzow	08-22-1995	
	07	5,574,364		Kajimoto, et al	11-12-1996	
	08	5,602,471		Muth, et al	02-11-1997	
	09	5,650,721		van den Berg, et al	07-22-1997	
	10	5,731,702		Schroeder, et al	03-24-1998	
	11	5,744,950		Seefeldt	04-28-1998	
	12	5,754,042		Schroeder, et al	05-19-1998	
	13	5,796,249		Andraet, et al	08-18-1998	
	14	5,850,142		Rountos, et al	12-15-1998	
	15	5,861,745		Herden	01-19-1999	
	16	6,064,197		Lochmann, et al	05-16-2000	
	17	6,130,535		Herden, et al	10-10-2000	
	18	6,137,288		Luetzow	10-24-2000	

FOREIGN PATENT DOCUMENTS								
Examiner Initials <sup>1</sup>	Cite No. <sup>1</sup>	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T <sup>6</sup>
		Office <sup>3</sup>	Number <sup>4</sup>	Kind Code <sup>5</sup> (if known)				
				</				

<b>Examiner Signature</b>	<b>Date Considered</b>	6/03
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<sup>1</sup>EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>2</sup> Unique citation designation number. <sup>3</sup> See attached Kinds of U.S. Patent Documents. <sup>4</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>5</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>6</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>7</sup> Applicant is to place a check mark here if English language Translation is attached.

**Burden Hour Statement:** This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

# **Notice of References Cited**

Application No.

10/287322

Applicant(s)

Examiner

W. S. How

Group Art Unit

2862

Page \_\_\_\_ of \_\_\_\_

## **U.S. PATENT DOCUMENTS**

*		DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A		5818223	10/1998	Wolf	324	207.2
B						
C						
D						
E						
F						
G						
H						
I						
J						
K						
L						
M						

## **FOREIGN PATENT DOCUMENTS**

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N							
O							
P							
Q							
R							
S							
T							

## **NON-PATENT DOCUMENTS**

*		DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U			
V			
W			
X			

\* A copy of this reference is not being furnished with this Office action.  
(See Manual of Patent Examining Procedure, Section 707.05(a).)

Please type a plus sign (+) inside this box → ☐

PTO/SB/21 (08-00)

Approved for use through 10/31/2002. OMB 0651-0031

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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# TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/087,322
Filing Date	02/28/2002
First Named Inventor	FREDERICK
Group Art Unit	
Examiner Name	
Attorney Docket Number	

Total Number of Pages in This Submission 16

## ENCLOSURES (check all that apply)

- ☒ Fee Transmittal Form (1 page)
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- ☒ Amendment / Reply (14 pages)
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  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53

- ☐ Assignment Papers (for an Application)
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) \_\_\_\_\_

- ☐ After Allowance Communication to Group
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) (please identify below):

Remarks

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm  
or  
Individual name

Keith Frantz

Signature

*Keith Frantz*

Date

11-10-03

## CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on this date: 11-10-03

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Keith Frantz

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*Keith Frantz*

Date

11-10-03

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# FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 110

## Complete if Known

Application Number	10/087,322
Filing Date	02/28/2002
First Named Inventor	FREDERICK
Examiner Name	
Art Unit	
Attorney Docket No.	

## METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account:

Deposit Account Number	
Deposit Account Name	

The Director is authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Credit any overpayments  
☐ Charge any additional fee(s) or any underpayment of fee(s)  
☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

## FEE CALCULATION

### 1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	
SUBTOTAL (1)				(\$)	

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims  -20\*\* =  X  =   
 Independent Claims  -3\*\* =  X  =   
 Multiple Dependent  =

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1202	18	2202	9	Claims in excess of 20	
1201	86	2201	43	Independent claims in excess of 3	
1203	290	2203	145	Multiple dependent claim, if not paid	
1204	86	2204	43	** Reissue independent claims over original patent	
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)				(\$)	

\*\*or number previously paid, if greater; For Reissues, see above

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

Large Entity Small Entity

Fee Code	Fee (\$)	Fee Code	Fee (\$)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for ex parte reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	110
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) \_\_\_\_\_

\*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 110

## SUBMITTED BY

Name (Print/Type)	Keith FRANTZ	Registration No. (Attorney/Agent)	37828	Telephone	815-987-9820
Signature		Date	11-10-03		

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This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	)	
	)	
Inventor: FREDERICK et al.	)	Examiner: SNOW, Walter E.
	)	
Title: METHODS AND APPARATUS FOR	)	
SENSING ANGULAR POSITION AND SPEED	)	
OF A ROTATABLE SHAFT UTILIZING	)	
LINEARIZED ANNULAR MAGNET AND	)	
COMMUTATED RATIOMETRIC HALL	)	
SENSORS	)	
	)	
Serial No. 10/087,322	)	Group Art Unit: 2826
	)	
Filing Date: 02/28/2002	)	

Mail Stop - Fee Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO OFFICE ACTION

**I. INTRODUCTORY COMMENTS**

In response to the current Office Action, please amend the above-identified application as follows:

- *In the Claims*: amend claims 1-2, 4-5, 7-9, 19 and 21, and add claim 22 as provided for below. Claims 1-22 remain in the application.
- *In the Specification*: replace the two paragraphs as indicated below.

## II. AMENDMENTS TO THE CLAIMS

Claim 1. (currently amended) A sensor adapted to sense the angular position of a rotatable shaft, the sensor comprising:

an annular magnet connected for rotation coaxial with the shaft; the annular magnet having been magnetized according a method comprising ~~the step of temporarily inserting an iron core through its inside diameter~~ during magnetization thereof to obtain enhanced linearity of magnetic flux density as the magnet rotates about its center axis;

a first stationary magnetic field sensor element positioned to sense the change in magnetic flux as the magnet rotates and adapted to provide an output signal proportional to the magnetic flux sensed; and

an amplifier circuit operable to amplify the output signal from the sensor element and to provide an output signal having a magnitude proportional to the angular position of the shaft.

Claim 2. (currently amended) The sensor as defined in claim 1 further comprising a magnetic-shield housing, and in which said shaft extends through the housing and through the center of the annular magnet, and the sensor element is ~~are~~ located in the housing outwardly of ~~around the magnet~~ shaft.

Claim 3. (original) The sensor as defined in claim 1 further comprising a second magnetic field sensor element spaced 180 degrees from said first sensor element, and in which the annular magnet is magnetized with two radial poles spaced 180 degrees apart.



Claim 4. (currently amended) The sensor as defined in claim 3 in which said method includes the step of sizing the magnet to obtain ~~for~~ enhanced linearity of magnetic flux density as the magnet rotates through ~~over a range of~~ approximately +/- 60 degrees ~~of rotation~~ from a neutral position equi-distance between said poles.

Claim 5. (currently amended) The sensor as defined in claim 4 in which the amplifier circuit provides a differential output voltage that varies linearly with shaft rotation of approximately +/- 60 degrees from said neutral position.

Claim 6. (original) The sensor as defined in claim 5 in which the differential output voltages are referenced to a desired voltage level.

Claim 7. (currently amended) The sensor as defined in claim 5 in which the amplifier circuit includes an input network resistor to produce an amplified and noise-filtered output signal proportional to shaft angle through said approximately ~~for~~ +/- 60-degrees of rotation from said neutral position.

Claim 8. (currently amended) The sensor as defined in claim 5 in which the amplifier circuit includes an input network capacitor to produce an amplified and noise-filtered output signal proportional to the shaft rate of rotation through said approximately ~~for~~ +/- 60 degrees of rotation from said neutral position.

Claim 9. (currently amended) A sensor adapted to sense the angular position or speed of a rotatable shaft, the sensor comprising:

a bipolar annular magnet connected for rotation coaxial with the shaft; the annular magnet having its poles located 180 degrees apart and having been magnetized according a method comprising ~~the step of temporarily~~ inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of flux density as the magnet rotates about its center axis through ~~over a range of~~ approximately +/- 60 degrees ~~of rotation~~ from a neutral position equi-distance between the poles;

three pairs of magnetic field sensor elements positioned to sense the change in magnetic flux as the magnet rotates; the pairs of sensor elements being operatively spaced 120 degrees apart and adapted to provide differential signals that are 120 degrees out of phase with each other as the magnet rotates; said differential signals comprising linear segments having magnitudes proportional to the angular position of the shaft for 120 degree increments of shaft rotation;

a commutation circuit receiving said differential signals and providing logic signals indicative of said linear segments; and

an output block receiving said logic signals and said linear segments, and adapted to provide an output signal therefrom, the output signal having a magnitude proportional to one of (i) the angular position and (ii) the rate of rotation of the shaft.

Claim 10. (original) The sensor as defined in claim 9 in which the commutation circuit is operative to provide said logic signals based on the signal polarity of said differential signals, and in which said output block is operative to select said linear segments based on said logic signals and to provide said output signal comprising said selected linear segments.

Claim 11.(original) The sensor as defined in claim 10 in which the commutation circuit comprises comparators operative to provide said logic signals in the form of high-low signals from the signal polarity of said differential signals.

Claim 12. (original) The sensor as defined in claim 11 in which the high-low logic signals are manipulated by four NOR gates prior to said output block, two of said NOR gates being configured to function as logic inverters.

Claim 13. (original) The sensor as defined in claim 12 in which said output block includes a multiplexer receiving said high-low logic signals from said NOR gates, said multiplexer being operative to selectively switch said linear segments to a common port in response to said high-low logic signals to establish said output signal comprised of said switched linear segments.

Claim 14. (original) The sensor as defined in claim 9 further comprising an amplifier circuit receiving said differential signals and supplying said differential signals to said commutation circuit in the form of amplified differential signals, the amplifier circuit including an input network capacitor adapted to produce said amplified signals proportional to the shaft rate of rotation through 360 degrees of rotation.

Claim 15. (original) The sensor as defined in claim 14 in which the input network further comprises input resistors biased to provide equal amplified linear segments at intermediate switch points therebetween and an output voltage which is proportional to shaft rotational angle for a full 360-degree rotation.

Claim 16. (original) The sensor as defined in claim 11 in which said output block includes a microcomputer operative to establish signal switching points in response to said logic signals, and to provide said output signal comprised of said linear segments merged at said signal switching points.

Claim 17. (original) The sensor as defined in claim 16 in which the microcomputer establishes said signal-switching points in response to shaft rotation.

Claim 18. (original) The sensor as defined in claim 16 in which the microcomputer stores the voltage difference between said switch points and provides gain correction factors to each linear segment.

Claim 19. (currently amended) The sensor as defined in claim 16 in which the microprocessor numerically ~~numerical~~ biases said linear segments to mathematically match the segments at said switch points.

Claim 20. (original) The sensor as defined in claim 16 in which the microprocessor is operative to calculate the rate of change of position and provide said output signal proportional thereto.

Claim 21. (currently amended) A sensor adapted to sense the angular position of a rotatable shaft, the sensor comprising:

a bipolar annular magnet connected for rotation coaxial with the shaft; the annular magnet having its poles located 180 degrees apart and having been magnetized according a method comprising ~~the step of temporarily inserting an iron core through its inside diameter~~ during magnetization thereof to obtain enhanced linearity of flux density as the magnet rotates about its center axis through ~~over a range of approximately +/- 60 degrees of rotation~~ from a neutral position equidistant ~~equi-distance~~ between the poles;

three pairs of magnetic field sensor elements positioned to sense the change in magnetic flux as the magnet rotates; the pairs of sensor elements being operatively spaced 120 degrees apart and adapted to provide differential signals that are 120 degrees out of phase with each other as the magnet rotates; said differential signals comprising linear segments having magnitudes proportional to the angular position of the shaft for 120 degree increments of shaft rotation;

an amplifier circuit operable to amplify the differential signals; and

a microprocessor-based circuit receiving said amplified differential signals and operative to provide an output signal proportional to one of shaft angular position and shaft speed through 360 degrees of shaft rotation.

Claim 22. (new) A sensor adapted to sense the angular position of a rotatable shaft, the sensor comprising:

an annular magnet having two poles on its outer diameter and connected around the shaft for rotation therewith such that the shaft extends through the center of the annular magnet; the annular magnet having been magnetized according a method comprising inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of magnetic flux density as the magnet rotates about its center axis;

a pair of angularly spaced magnetic field sensor elements positioned radially outwardly of the annular magnet to sense the change in magnetic flux as the magnet rotates, and to provide an output signal indicative of the magnetic flux sensed; and

an amplifier circuit operable to amplify the output signals from the sensor elements and to provide an output signal having a magnitude proportional to the angular position of the shaft.

### III. AMENDMENTS TO THE SPECIFICATION

**Replace the second full paragraph on page 10, lines 8-11, with:**

Figure 2 is a fragmentary cross-sectional view taken substantially along the line 2-2 of Figure 1, and showing a top plan view of the annular magnet and magnetic field sensor elements.

**Replace the paragraph beginning on page 24, line 17, through page 25, line 3, with:**

When configured as a tachometer for sensing complete revolutions of the shaft 14, the sensor 50 includes three Hall-device sensor pairs 16 arranged as shown in Figure 8, three amplifier circuits 34b generally depicted in Figure 6b, and the commutation circuit 58 shown in Figure 10. The input resistors 38 are omitted from the amplifier circuits to create an identical differentiating circuit for each segment, producing outputs voltages  $V_{12}$ ,  $V_{56}$ , and  $V_{43}$  that are proportional to shaft speed. The mean operating level of each output segment  $V_{12}$ ,  $V_{56}$ , and  $V_{43}$  is adjusted to equal voltage ~~voltages~~ levels by tuning of the associated bias reference voltage  $V_{REF}$ . Figure 11 shows a graph of a typical output voltage  $V_{out}$  from the sensor 50 versus rotational rate for a continuously rotating shaft. This produces a contactless equivalent to a brush tachometer without the low reliability and shorter life associated with brush tachometers, is easily integrated into an overall actuator or motion control package, and requires only a few inexpensive components to implement.

#### **IV. REMARKS**

##### **Amendments to the Specification:**

Pursuant to the current amendment format guidelines, replacement paragraphs for the specification are presented, with revision markings to show changes from the immediately prior version thereof.

Changes to the specification are for correction of typographical errors. The changes to the specification do not introduce new matter into the application.

##### **Amendments to the Claims:**

Pursuant to the current amendment format guidelines, a complete listing all claims presented in the application, with current claim status, is listed above, along with the text of all claims currently under examination, and with revision markings to show current changes to currently amended claims as revised from the immediately prior version thereof. Amendments to the claims do not introduce new matter into the application.

##### **Claim Rejection under 35 USC § 103**

Claims 1-3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf (US Patent No. 5,818,223).

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##### **Allowable Subject Matter**

Claims 4-8 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 9-21 were allowed in the Office Action.

Applicants thank the examiner for allowance of claims 9-21, and indication that claims 4-8 would be allowable if rewritten in independent form.



### **Summary of Amendments to the Claims**

As discussed in detail below, claim 1 has been amended for clarification of differences with the Wolf angular sensor unit. Independent claims 9 and 21 have been amended for consistency with the amendment to claim 1. Amendments to dependent claims 2, 4-5, 7-8 and 19 are for consistency with the amended claims from which they depend, for additional clarification of differences with the prior art, for ease of reading, and/or for correction of typographical errors. New independent claim 22 was added as further definition of the invention to which applicants believe they are entitled.

### **Response to Rejection - Request for Reconsideration**

Applicants request reconsideration of the rejection of claims 1-3. Applicants have carefully reviewed the Wolf patent, and do not believe it discloses the claimed subject matter.

The present invention provides for, among other things, an angular sensor with an annular magnet that has been magnetized with an iron core in its center. As discussed further on pages 7, and 16-18 of the Specification, and shown in FIGS. 3, 4 and 5a-b, magnetizing an annular magnet with an iron core permanently reshapes the flux density characteristic of the magnet as compared with the flux density characteristic of a conventionally magnetized annular magnet (magnetized without an iron core through its center). In particular, magnetizing the annular magnet with the iron core reshapes the flux density characteristic of the magnet towards the flux density characteristic of the iron core, resulting in permanently enhanced linearity flux density characteristics of the annular magnet. The iron core is not part of the completed sensor, but is used during magnetization of the annular magnet to obtain enhanced linearity of the magnetic flux density of the magnet as it rotates about its center axis.

In contrast, Wolf utilizes flux concentrators assembled into the angular sensor to obtain a sensor element output signal with enhanced linearity as compared to what the sensor element output signal would be without the flux concentrators. (See e.g., Wolf, Col. 5, Lines 25-52, FIG. 7). The annular magnet in the Wolf sensor is a conventional magnet, and provides conventional annular magnet flux density characteristics. (Col. 5, Lines 37-41, "line 72" in FIG. 7). The flux concentrators affect the flux density characteristic as sensed by the sensor element, they do not affect the flux density characteristic of the magnet itself. But for the flux concentrators assembled into the unit to reshape the flux density characteristic sensed by the sensor element, the Wolf angular sensor would not exhibit enhanced linearity characteristics. Wolf does not teach, discuss or suggest anything with regard to magnetizing of the annular magnet. Instead, it teaches an arrangement that compensates for the otherwise non-linear characteristics of the magnet in the completed sensor.

Consequently, Wolf lacks an essential element of claim 1. Wolf does not anticipate or contemplate use of an annular magnet that has been magnetized with an iron core to obtain enhanced linearity of flux density characteristics of the magnet.

To clarify the differences between the invention as presented in claim 1, and the Wolf arrangement, claim 1 has been amended to read, in pertinent part: "the annular magnet having been magnetized according a method comprising inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of magnetic flux density as the magnet rotates about its center axis."

Claim 2 recites, among other things, the annular magnet and sensor element of claim 1 being located around the shaft. In addition to the considerations with regard to claim 1 discussed above, Wolf does not disclose or suggest positioning the annular magnet around the shaft or

positioning the sensing element outwardly of the magnet as now clarified in amended claim 2. Instead, Wolf positions the annular magnet inside a sleeve on the shaft and positions the sensing element inside the annular magnet (FIGS 16-17). In particular, Wolf positions the sensing element (204) sandwiched between L-shaped flux concentrators (206) and below the axially adjustable annular flux concentrator (208). This positioning is important to the performance of the flux concentrators, and there is no suggestion in Wolf that positioning the sensing element and L-shaped flux concentrators outside the magnet would result in a operative unit. As a result, positioning the sensor element outside the annular magnet as recited in claim 2 is not equivalent to or obvious in view of the Wolf arrangement.

As will be seen by comparison of FIG. 16 of Wolf, and FIG. 1 of the present Application, the difference in sensor element positioning and basic operations results in two quite different sensor units. Positioning the sensing element inside the annular magnet in Wolf results in a relatively complicated sensor unit, with a sleeve to hold the sensing element inside a sleeve to hold the magnet, inside a sleeve to seal the top of the unit. In contrast, positioning the sensor element outside the annular magnet as taught in the present invention results in a simple arrangement, with a substantially reduced number of parts of much simpler configuration.

~~Claim 3 recites, among other things, the sensor of claim 1 with a second sensor element~~ spaced 180 degrees from the first sensor element. In addition to the considerations with regard to claim 1 discussed above, Wolf does not provide for a second sensing element spaced 180 degrees from the first sensing element (204).

For the foregoing reasons, Applicants believe that Wolf does not anticipate claims 1-3 as originally presented or as amended herein. Therefore, Applicants respectfully request